

nerdling

issue #7

And Mr Silly wanted to go to the moon.
How silly.



a zine of physics,
maths and sci-fi

introduction

In last issue's editorial, I said that being a nerd meant not caring about being cool. In today's society cool and uncool alike are slippery concepts on a slope that seems to lead straight into the vortex of corporate marketing. One moment you think you're rebelling against the establishment by wearing straight jeans when everyone else is wearing flared, and the next moment you find that spirited teenage fashion-flouting is the new ideology-du-jour and you're right in the middle of the next uncool-is-cool demographic. Even if you play outside their rules by adopting camp and ironic acceptance of whatever the ads tell you to do, then they'll redefine the target market and develop an ad campaign for that too.

So what do you do when everything you stand for becomes nothing more than a convenient image for corporations to peddle their shit to the world? How do you act when feminism, animal rights and body image are the latest corporate buzzwords to sell bubble bath crystals; when soft drink companies sell brand names specifically to a brand-name cynical generation; when caring about the environment is so hijacked by political correctness that it's dangerous to stand up in a campus meeting and say it's more energy efficient to use disposable plates in the cafeteria than rewash crockery ones? Is it possible to be an individual in this environment?

It is, and the people who manage it are the nerds—the science nerds, the environment nerds, the writer nerds, the gamut. I mentioned above that the secret of nerdism is not caring about being cool—and this means not caring about being uncool, either. It means not feeling you need to change *out* of your worn old jeans just because they're now *in*. It means still being able to think for yourself, no matter how 'cool' your political or social cause happens to be at the time. Nerdism is a freedom to act according to ideals: the quest for knowledge, the lust for exploration, the desire for betterment. It is *not* about money, and nor is about using exaggeration or falsification as means to an end, no matter how much the end might seem to justify the means.

On page 14 is an excerpt from an article which appeared in a recent issue of *Ad Astra*, the journal of the (American) National Space Society. In it, the author suggests that the drive for discovery and knowledge is an old-fashioned relic totally out of touch with the modern paradigm, and the only way to get people to the stars is to sell 'em off first, bit by bit. He says that creativity or exploration will only be accepted by the population if it's sold to them in pieces by a corporation, or marketed as a Disney-World tourist trip, and that the moon is "inherently worthless" if private companies are denied the right to claim parts of it. **nerdling** does not agree.

We as nerds are proof that there are people yet who believe in the joy of learning things just for the sake of it. We revel in pushing boundaries because we know the exhilaration of discovery and self-discovery. Sometimes in this world, where people forget they can do things without corporate sponsorship and it really can seem like ideologies exist to sell products in clever advertisements, we have to remember that there are others like us: people who step outside the crazy Klein-bottle of cool-is-uncool-is-cool, shun what people tell us to think, and do the thinking for ourselves. In between all the physics jokes and wacky segments, this is what **nerdling** tries to stand for.

In the end, though, **nerdling** is nothing more than a rag in which we put stuff we find interesting. If someone does see in it a subculture with which to identify, then that's great. All we'll say is: make sure **nerdling** is something that means something to you, not something that makes you mean something.

nerdling is not a brand name. That is not a postmodernist statement. And nor is that.

the übernerdling
editor, nerdling zine
april 2003

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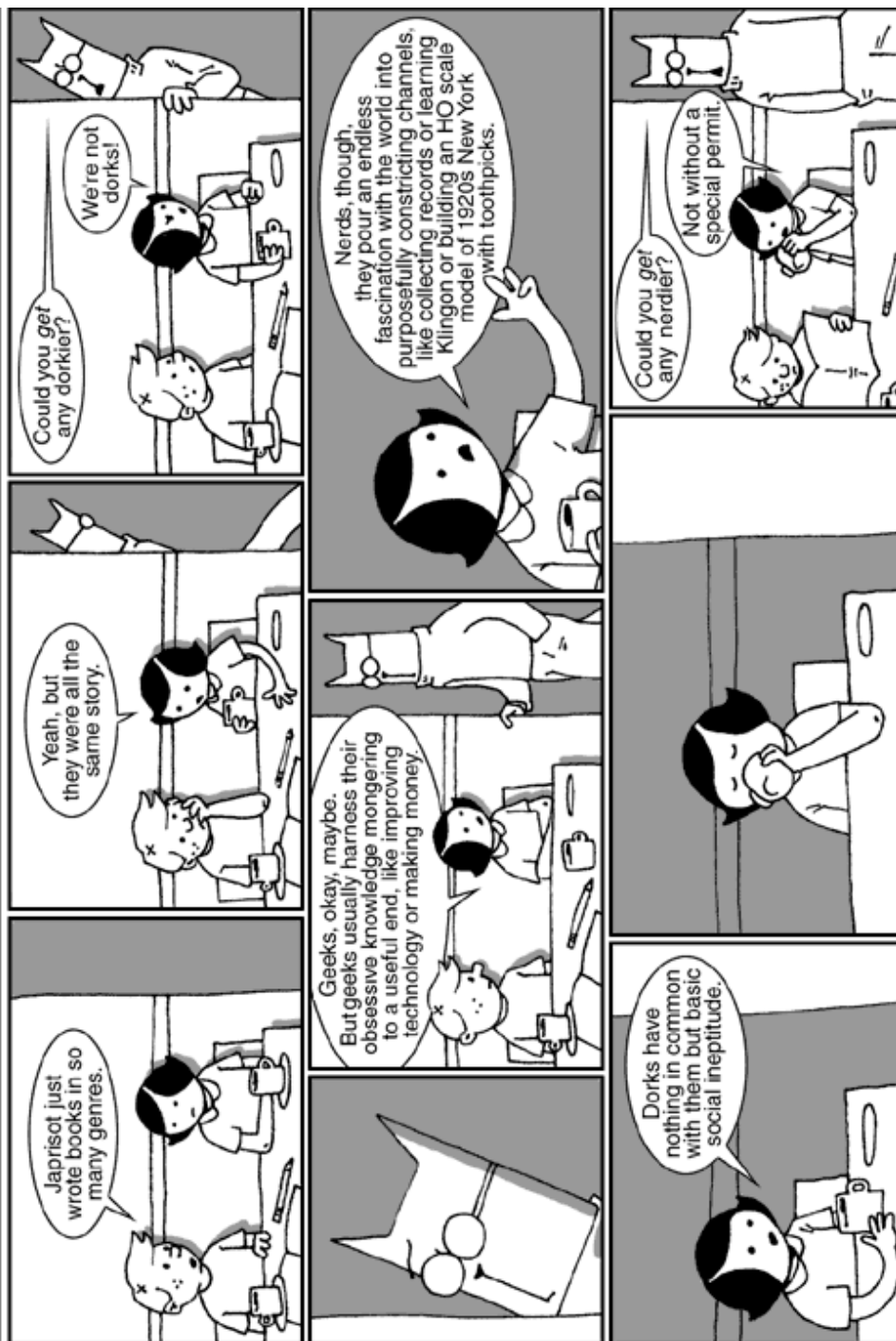
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it's fun, it's easy, it tastes great, you'll look like a mad scientist, and it involves ingredients at 200 degrees below zero. Nigella Lawson eat your heart out!



Glossary for Research Papers

THEY WRITE:

It has long been known that...

... of great theoretical and practical importance

While it has not been possible to provide definite answers to these questions...

The W-Pb system was chosen as especially suitable to show the predicted behaviour...

High purity...

Very high purity...

Extremely high purity...

Super-purity...

Spectroscopically pure...

A fiducial reference line...

Three of the samples were chosen for detailed study...

...handled with extreme care during the experiments

Typical results are shown...

Although some detail has been lost in reproduction, it is clear from the original photograph that...

Presumably at longer times...

The agreement with the predicted curve is

...excellent

...good

...satisfactory

...fair

...as good as could be expected

These results will be reported at a later date

It is suggested that...

It is believed that...

It may be that...

It is clear that much additional work will be required before a complete understanding...

Unfortunately, a quantitative theory to account for these effects has not been formulated

Correct within an order of magnitude

It is to be hoped that this work will stimulate further work in the field

Thanks are due to Joe Jones for assistance with the experiments and to Jane Smith for valuable discussions.

THEY MEAN:

I haven't bothered to look up the original reference

...interesting to me

The experiments didn't work out, but I figured I could at least get a publication out of it.

The guy in the next lab had some already made up.

Composition unknown except for the exaggerated claims of the supplier.

A scratch.

The others' results didn't make sense and were ignored...

...not dropped on the floor.

The best results are shown...

It is impossible to tell from the photograph.

I didn't take the time to find out.

...fair

...poor

...doubtful

...imaginary

...non-existent

I might get around to this sometime.

I think...

I don't understand it.

Neither does anybody else.

Wrong.

This paper isn't very good but neither are any of the others on this miserable subject

Jones did the work and Smith explained what it meant.

Source: the noticeboard at the back of the physics lab





The Klingon Language

The Klingons are one of the most well-recognised alien races in the Star Trek universe. They're big, they're ugly, they shout all the time and they love to fight and talk about honour. We're told a lot about them in the course of the Star Trek series: we know that their nation was formed about 1200 years ago by Kahless the Unforgettable on the planet *Qo'noS* (the original writers were going to call it Kling, until they realised it sounded rather silly). We know their blood is lavender and they have several sets of each organ, making them resilient in battle. We've been shown their flipping awesome starships (such as the Bird of Prey above), their fighting weapons of choice (generally using a curved blade called a *bat'leth*) and their foreplay (consisting of hurling dangerously heavy or sharp objects at their partner from across the room). In addition, an entire history of galactic politics and Klingon genealogy has been carefully built up by the series writers.

Perhaps the most amazing thing, however, is the fact that an entire new language has been created for this alien culture. A linguist named Dr Mark Okrand was called upon to invent a coherent alphabet, vocabulary, grammar and usage for Klingon. And in the way only nerds know how, thousands of Trekkers around the world have bought Okrand's books and put a lot of time and effort into the almost totally useless pastime of learning a language that does not and has never existed. People have even created the *Klingon Shakespeare Restoration Project*, which has, amongst other works, republished Hamlet in (quote) "the original Klingon".

As nerds, who by definition pour unneeded amounts of energy into useless intellectual pursuits, we know you'll love this issue's special Introduction to the Klingon Language. It's not designed to teach you to communicate like a native; rather, it will teach you to speak, read and write just well enough to survive a short stay on Qo'noS next time you stop over. Part 1 will show you some useful phrases; Part 2 will show you how to say them, and Part 3 will teach you to write in the Klingon alphabet. Learning Klingon—this is about as nerdy as it gets. We're proud to bring it to you.

Part 1: Learn some Basic Klingon Phrases.

Below is a list of useful phrases to get you started in Klingon. Use the pronunciation guide in Part 2 on the next page to help you speak them correctly. Practise them on your pets, your friends, or the other guys in the *Qulpa'* (research lab). Remember to speak forcefully, and never, ever use any of the insults on a Klingon.

Yes. (answer to yes/no question) HIja' or HISlaH

No. (answer to yes/no question) ghobe'

Yes, OK, I'll do it. lu' or luq

No, don't, I won't. Qo'

Hello. (Roughly, "What do you want?") nuqneH

What's happening? qaStaH nuq?

Huh? nuqjatlh?

I understand. jIyaj

I don't understand. jIyajbe'

Good! (expression of satisfaction) maj

Well done! majQa'

Where is the bathroom? nuqDaq 'oH puchpa'e'

Come in yI'el (to more than one person: pe'el)

Come here. HIghoS

Go away. naDevvo' yIghoS (to more than one person: naDevvo' peghoS)

Open the door! lojmIt yIpoSmoH!

Don't be silly. yIDoghQo' (to more than one person: peDoghQo')

Your mother has a smooth forehead! Hab SoSI' Quch! (a powerful insult)

Today is a good day to die. Heghlu'meH QaQ jajvam

We are Klingons! tlhIngan maH!

Happy birthday. qoSIIj DatIvjaJ

What time is it? 'arlogh Qoylu'pu'? (Literally, "How many times has it [presumably some traditional hour alarm] been heard?")

Shut up! bIjatlh 'e' yImev (to more than one person: Sujatlh 'e' yImev)

That's great news! buy' ngop (Literally, "The plates are full")

Ferengi dog verengan Ha'DIbaH (a classic insult)



Part 2: Learn the Sounds of Klingon

The Klingon language is a guttural, harsh language that tends to involve a lot of spit. It should be spoken forcefully and loudly. Don't be afraid to sound like you're gargling or coughing up some sort of fur ball.

Here's a description of the sounds of Klingon. Note that some of the sounds are represented by more than one letter of English. You should think of these combinations as *single letters*, since they represent single, simple sounds in Klingon. (Each sound is represented in *Klingon writing* by a special character, which you will learn in Part 3.)

You'll also find that Klingon (when written using English characters for ease of pronunciation) uses capital and lowercase letters a bit differently from normal. Mostly, capital letters are used to help remind you that a letter sounds different in Klingon than it does in English. Be careful when writing Klingon to use the correct capitalization (*i.e.*, the capitalization appropriate for the *sound*; do not capitalize the first letter of your sentences in Klingon), since otherwise it's hard for people used to the language to read it. Be especially careful with q and Q, since these represent different sounds in Klingon. Also be careful with the letter ' , the apostrophe. It may not look like much to English-accustomed eyes, but in Klingon it's a full-fledged letter. Omitting it would be like deciding it's not important to type "t"s in English anymore.

- a** Like the "a" sound in English "father." Never like in "bat".
- b** Like in English "bob" or "playbill."
- ch** Like in English "chew" or "chocolate."
- D** Not quite like the English "d" sound. Touch the tip of your tongue to the very top of your mouth, the highest point on your palate, instead of near the teeth like for an English "d." Then do the same thing you'd do to make a "d."
- e** Like the "e" in English "bed."
- gh** A gargled sound, at the back of the throat. Like the Klingon H, only voiced. It's very much like the French gargled "r."
- H** A harsh sound in the throat, found in German (as in "Bach"). Make sure you pronounce this harshly and unvoiced.
- I** Like the "i" sound in "bit."
- j** Like the "j" in "junk." Never like in French "jour."
- l** Like in "lunch."
- m** Like in "mother."
- n** Like in "nose" or "any."
- ng** The same sound as occurs at the end of English "thing," only in Klingon it can also come at the beginnings of words. Be careful when starting a word or syllable with this sound. It's against the rules of English, and it may take some practice.
- o** Like in English "note" or "mosaic." As with other letters, don't get distracted by English words spelled with the same letters. The Klingon word 'not' sounds like English "note"
- p** Like in English "pipe" or "pop." Pronounce it with a puff of air.





































- q** A little like English "k," but not really. This sound is to be made as far back in your mouth as possible, with the back of your tongue actually touching your uvula (the fleshy blob that hangs down over your throat). It sounds a little like you're choking.
- Q** A little like a Klingon q immediately followed by a Klingon H. Close off your mouth as far back as you can, like with q, and force air up, like you're trying to dislodge food stuck in your throat. It sounds a lot like you're choking.
- r** A lightly trilled or rolled "r." If you can't trill with the tip of your tongue, just do a flap (or even a regular English r will be understood), but don't gargle the "r," or it'll sound like a gh.
- S** A sound somewhat like an English "sh," but made farther back. Put your tongue where you did for the Klingon D, but don't quite touch the roof of your mouth. Make an "s" sound with your tongue up there.
- t** Like English "t" in "tip." Pronounce it powerfully, with a puff of air.
- tlh** This is a tough one to describe. Put your tongue in position to say a "t," but instead of pulling the tip of your tongue away from your palate, drop the *sides*, sort of like what happens near the end of the word "waddle" in English. This should leave you in position to say an "l," but make sure you don't use your voice: whisper the "l"; hiss it out between your teeth. The dropping of the sides of your tongue should be done forcefully; this is another spitter.
- u** Like in "prune" or "fool."
- v** Like in "vicious."
- w** Like in "wisdom." Sometimes this sound will follow an a, an e, or an I, yielding:
aw, rhyming with English "cow."
ew, not like anything in English. Basically the "e" in "bed" run into a "w." A good way to get to this is to think of Elmer Fudd saying "tewwible."
Iw, also unlike anything in English. Again, it's like the "i" in "bit" run into a "w." It's close to "Eww!" the expression of disgust.
- y** Like in English "yet." This sound, like w, forms diphthongs:
ay, rhyming with English "why."
ey, rhyming with English "may" (*Note:* The Klingon word may, of course, sounds like English "my." See above).
Iy, rhyming with English "key."
oy, rhyming with English "boy."
uy, sort of like English "gooeey," but in one syllable, not two.
- '** A sound we use in English, but don't consider a sound. It's the catch in the throat we put in the beginnings of words that start with vowels, or in phrases like "uh-oh." In Klingon, it can also come at the ends of syllables, where it has to be pronounced carefully (e.g. the words tl and tI' have very different meanings). This one takes practice to get right in all positions.



Part 3: Write the Klingon Alphabet

Now that you are familiar with the sounds, you can learn how to write them in the Klingon language. Although several tables of characters have been circulated, the one which has been most widely accepted is presented below. It has become the standard Klingon character set due to the fact that (unlike the others) the letters correspond to the Klingon sounds, not just the English alphabet; also, the shape of the letters can be reasonably well reproduced using a thick pen or brush.

Study the table below and practise reproducing the characters.

| | | | | | | |
|--|--|--|---|---|---|---|
|  |  |  |  |  |  |  |
| a | b | ch | D | e | gh | H |
|  |  |  |  |  |  |  |
| I | j | l | m | n | ng | o |
|  |  |  |  |  |  |  |
| p | q | Q | r | S | t | tlh |
|  |  |  |  |  | | |
| u | v | w | y | ' | | |
|  |  |  |  |  |  |  |
| 0 | 1 | 2 | 3 | 4 | 5 | 6 |
|  |  |  | | | | |
| 7 | 8 | 9 | | | | |

Part 4: Become an Expert

It's easy to find more advanced reading on the Klingon language. Your first stop should be www.kli.org, the home of the Klingon Language Institute and the source of the information in this article. It's got links to *HolQeD*, the institute's journal, and can put you in touch other speakers of Klingon, or let you put your skills to use in their Writing Projects or even the Bible Translation Project. You can order coursework books from the site, including some by the language creator Mark Okrand, as well as the Klingon translations of *Hamlet* and *Much Ado About Nothing*.

The official Star Trek website also has a fair vocabulary list at www.startrek.com/library/klingon.asp.

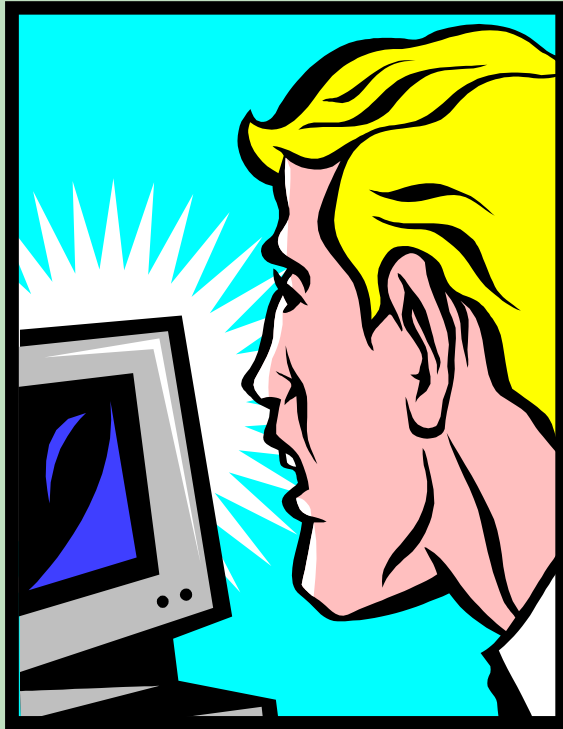
upcoming birthdays: may & june

Close up the lab, get your mates around,
and chuck a big birthday party for your
favourite nerd.



- May 6: **Sigmund Freud** (1856): Austrian neurologist and psychotherapist; proposed the existence of an unconscious element in the mind.
- May 11: **Salvador Dali** (1904): surrealist artist who frequently used mathematical ideas and constructions in his works.
- Richard P. Feynman** (1918): physicist, Nobel laureate, and renowned teacher of science.
- May 13: **Roger Zelazny** (1937): American 'New Wave' science fiction and fantasy writer, who often based his stories on myths and legends.
- May 14: **George Lucas** (1944): creator of the *Star Wars* and *Indiana Jones* films.
- May 15: **L. Frank Baum** (1856): author of *The Wizard of Oz*.
- May 21: **Andrei Sakharov** (1921): Soviet physicist who, after spending twenty years inventing nuclear weapons for Russia, became the leading spokesperson against them.
- May 22: **Arthur Conan Doyle** (1859): creator of *Sherlock Holmes*, the first literary detective to solve cases using scientific methods.
- May 23: **Friedrich Anton Mesmer** (1734): Austrian physician, remembered for introducing hypnotism as a therapeutic technique.
- May 26: **Sally Ride** (1951): first American woman in space (20 years after Valentina Tereshkova became the first woman in space)
- June 8: **John W. Campbell, Jr** (1910): editor of *Astounding Science Fiction*, the foremost of the pulp science fiction magazines in the 1940s.
- June 9: **Joe Haldeman** (1943): science fiction writer; winner of the Hugo and Nebula awards for Best Science Fiction Novel.
- June 18: **M.C. Escher** (1898): Dutch graphic artist whose works often incorporated mathematical ideas or techniques.
- June 24: **Fred Hoyle** (1915): English astronomer and mathematician who supported the steady-state cosmological model.
- June 25: **George Orwell** (1903): author of *1984* and *Animal Farm*.

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THE SPACE SETTLEMENT INITIATIVE

This month's *Dodgy Science* is more about science politics than science proper, but it has been chosen for this segment because it highlights an increasingly important issue in science today: the question of whether the government has an obligation to support worthwhile projects (and we must trust ourselves to the fickle winds of political whim) or whether corporate sponsorship is the only option. The extract below is from an article published in the September/October 2002 issue of *Ad Astra*, the magazine of the National Space Society. It is written by Alan Wasser, a former CEO of that organisation, and he firmly believes that if the ideological idea of space exploration isn't enough to make taxpayers scramble for their purses, then we should motivate them the only way possible: by slicing up the moon and sellin' it to private corporations. Wasser's plan is based on a fundamental belief that humans are only motivated by greed, and that the ends justify the means—even if the 'means' involve zero international consultation and a moon owned by Lockheed Martin. **nerdling** disagrees. Both opinions are made clear in the annotated extract below. An overview of current space law is presented on the next page.

The settlement of space would benefit all of humanity by opening a new frontier, energising our society, providing room and resources for the growth of the human race without despoiling the Earth, and creating a lifeboat for humanity that could survive even a planet-wide catastrophe. *rich people*
Like Apollo, axed prematurely? Like the ISS?
coz the moon is 5000 more inhabitable than desert/tundra.
coz investing billions in post-catastrophe survival is a lot better than investing in catastrophe prevention.
Unfortunately, it seems clear that, as things stand now, space settlement will not happen soon enough for any of us to see it. But that could be changed! The proposed Space Settlement Initiative would:
*Taxes are our ENEMIES...**
1) save NASA and the taxpayers the cost of developing affordable space transport by allowing private enterprise to assume the burden of settling space,
2) make it possible for ordinary people to purchase tickets and visit the Moon as tourists, scientists, or entrepreneurs,
now we get to the crux
3) create vast wealth from what is now utterly worthless. *Antarctica is worthless, too.*
so is happiness.
It will take billions of dollars to develop safe, reliable, affordable transport between the Earth and the Moon. Neither Congress nor the taxpayers wants the government stuck with that expense. Private venture capital will support such expensive and risky research and development ONLY if success could mean a multi-billion dollar profit. Today, there is no profit potential in developing space transport, but we have the power to change that.
it's government's job to implement projects that are for the good of the greater population. If this project is so beneficial and laudable, why aren't we assuming people will want to support it?
We have the power to create a "pot of gold" waiting on the Moon, to attract and reward whatever companies can be the first to assemble and risk enough capital and talent to establish a "space line" and lunar settlement.
How? By making it possible to claim and own—and re-sell to those back home on Earth—the product that has always rewarded those who paid for human expansion: land ownership. *Like the Antarctic explorers? Like the Apollo landings? Curiosity and adventure play no part either? ooh.*
In the mid 1960s, President Johnson saw he was going to be forced to take

money from the space race to fund the Vietnam War. He feared that, if that let the Russians win the race to the Moon, they might claim ownership of the Moon. So he proposed, negotiated, and the U.S. Senate ratified, what became known as the 1967 "Outer Space Treaty". Among other things, this treaty prohibits any claims of national sovereignty on the Moon or Mars, etc.

But, quite deliberately, the treaty says nothing against private property. Therefore, without claiming sovereignty, the U.S. could recognise land claims made by private companies, regardless of nationality, that establish human settlements on the moon or Mars. *Coca cola on the moon! Hurrah! Starbucks! Woo hoo!*

The proposed legislation would commit the U.S. to granting that recognition if those who establish the settlements meet specified conditions, such as offering to sell passage on their ships to anyone willing to pay a fair price. Entrepreneurs could use that promise of U.S. recognition to help raise the venture capital to develop the ships needed to make the claim.

It would take a really large land claim to be worth that huge investment, of course, but there is an amazingly large amount of land out there waiting to be claimed. For example, a claim of 600,000 square miles, about the size of Alaska, would be only around 4% of the Moon's surface, but would be worth about \$40 billion at even a very conservative price of \$100 an acre. *cha-ching!*

The price of the land might, by then, be much more. Under this proposal no one would be able to claim lunar land ownership without having first put into service a transport system going back and forth often enough to support settlement. Therefore, when they subdivide and offer U.S. recognised deeds for sale back on Earth, lunar land will actually be accessible. It will finally be understood to be land in the sky, not pie in the sky. It will be offered for sale after months of worldwide press coverage produced by the race to be the first to settle the Moon.

There will be land buyers with business purposes for buying and using land, but there will be a much bigger speculative and investment market. People will buy so they can leave an acre of land on the Moon to their grandchildren, or put their name on a crater. The profits on land sales which take place in the U.S. will, of course, be subject to U.S. taxes, so the Budget Office will score this legislation as a revenue producer, not a cost to the U.S. **... taxes are our FRIENDS*

It sounds strange because we haven't done it yet, but there is growing sentiment for extending private property and the benefits of free enterprise to space. Former House Science Committee chair Bob Walker has suggested that the Bush administration would like to develop such a legal structure. *— & Bush has done some GREAT things in his time.*

Before copyright and patent laws, no one could own songs, stories or ideas. The passage of those laws, creating intellectual property, made whole industries possible and added greatly to the world's wealth from things that had previously been valueless. Creating lunar property could be the incentive to open the space frontier to everyone, thus benefiting all of humanity. *rich people.*

→ same with the Terra Nullius laws that allowed white people to own Australia! Great! .. oh wait ...

Wasser seems to be gleeful in going to great lengths to prevent the misapprehension that the US government can be tainted with the brush of moral action.

not actually allowed

FUNDAMENTALS OF OUTER SPACE LAW

This page summarises only the main treaties on which space law is based, to give people interested in Wasser's plans (see preceding page) an idea of the existing framework.

It is clear that space law is a developing field, with a lot more work to be done. It is our duty to ensure that legal issues surrounding space are sorted out in the next few years, and in a way that is respectful of *all* cultures on the earth. With the European Space Agency planning Mars and moon landings, China and India developing manned space programmes aiming for the moon, and the U.S. pushing space corporatisation as hard as ever, it is important to reach agreement on how space is to be used. I for one don't want to see Nike etching a visible swoosh into their plot of moon land, or China and America having a war over the land rights to the near side of the moon.

The Outer Space Treaty

The basic principle of space law is the 'common interest' (or common heritage) principle which has been around since the first UN space resolution of 1958. The most important statement of this principle is the Outer Space Treaty of 1967, which says in the very first article:

"The exploration and use of outer space, including the moon and other celestial bodies, shall be carried out for the benefit and in the interests of all countries, irrespective of their degree of economic or scientific development, and shall be the province of all mankind [...] and there shall be free access to all areas of celestial bodies" [my italics].

The Treaty also says that every country is liable and responsible for damage caused as a result of its space activities. It also requires countries to be guided by the principle of cooperation and mutual assistance in the conduct of all their activities in outer space. The Registration Act of 1974, says that furthermore, each country must keep a public registry of all objects launched into orbit or beyond. This enables the UN to observe outer space activities of states.

The Moon Treaty

In 1979, the "Agreement On The Activities Of States On The Moon And Other Celestial Bodies" (referred to as the Moon Treaty) was ratified by many countries—with the notable exception of the United States. The U.S. objected to the treaty using the words "common heritage of mankind" instead of the previous "benefit of all mankind", because this would have banned private property.

The Moon Treaty also states that countries shall retain jurisdiction and control over their personnel, space vehicles, equipment facilities, stations and installations on the moon.

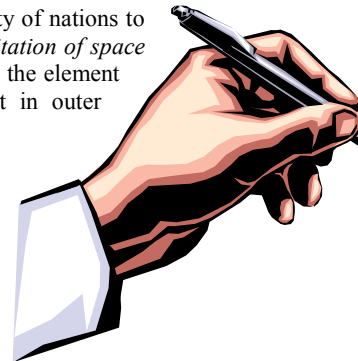
Other Comments

Böckstiegel, 1983: "It is obvious that the application of space technology will lead to the growing commercialisation of space activities, since such service—at least in the long run—can only be maintained and expanded, if it is self-financing."

Abeyratne, 2002: "The blending of high technology with a new forensic code of conduct on hitherto uncharted territory has brought to bear the need for the community of nations to formulate a sustainable legal theory that would *ensure non-exploitation of space resources by individuals or states*, at the same time incorporating the element of responsibility and liability for individual and state conduct in outer space" [my italics].

What This Means for the Moon Settlement Initiative

It seems that it may be possible for the US to legislate to recognise private ownership of moon land, however the owner of moon land would have no right to keep others off his land due to Article I



of the Outer Space Treaty. The 'ownership' would merely be a title allowing the owner to use the land for their own purposes.

Under the Outer Space Treaty, the U.S. would have no right to restrict foreign individuals or companies from 'owning' moon land. However, the U.S. would claim taxes from those individuals. Whether this contravenes the Treaty is unclear, but it certainly goes against the philosophy on which space law is based, as stated by Abeyratne above.

It is also unclear (to me, at least) what the repercussions are for non-U.S. citizens who may get to the moon by their own means. If the European Space Agency (for example) wishes to set up a remote monitoring station on a particular (undeveloped) moon location, but a U.S. citizen says they have already 'bought' the land title, is ESA under any obligation to recognise that? Certainly under the Outer Space Treaty, if ESA wishes to use the site to benefit the public at large, they have the right to do so, no matter what U.S. citizen may claim the crater as an heirloom for their grandchildren. Does this make Wasser's land claims worthless?

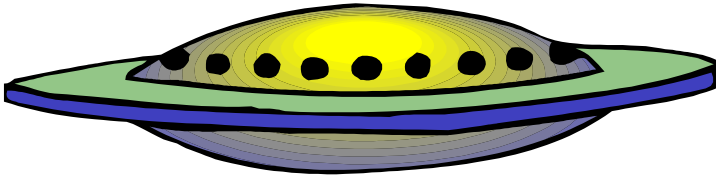
Sources: *Ad Astra* magazine, Sept/Oct 2002; *Frontiers of Aerospace Law*, R.I.R. Abeyratne.

You Might Be A Physics Student...

- ☐ if you enjoy pain.
- ☐ if you know vector calculus but you can't remember how to do long division.
- ☐ if you chuckle whenever anyone says "centrifugal force."
- ☐ if you've actually used every single function on your graphing calculator.
- ☐ if it is sunny and 25 degrees outside, and you are working on a computer.
- ☐ if you think in "maths."
- ☐ if you laugh at jokes about mathematicians.
- ☐ if you can translate English into Binary.
- ☐ if you can't remember what's behind the door in the science building which says "Exit."
- ☐ if you are completely addicted to coffee, Coke, V or Red Bull.
- ☐ if you avoid doing anything because you don't want to contribute to the eventual heat-death of the universe.
- ☐ if you consider ANY non-science course "easy."
- ☐ if when your lecturer asks you where your homework is, you claim to have accidentally determined its momentum so precisely, that according to Heisenberg it could be anywhere in the universe.
- ☐ if you'll assume that a "horse" is a "sphere" in order to make the maths easier.
- ☒ if you have a pet named after a scientist.
- ☐ if you understood more than five of these indicators.
- ☐ if you photocopy this list and blu-tac it to your door.

This list is an oldie but a goodie and was sent in by Russell Grew

SCIENCE FICTIONARY



CLOSE ENCOUNTERS OF THE FIRST KIND involve simple observations of phenomena where there is no physical interaction between the phenomena and the environment.

CLOSE ENCOUNTERS OF THE SECOND KIND are similar to the first kind, except that physical effects on both animate and inanimate matter are observed. Vegetation may be scorched or flattened, tree branches broken, animals frightened or car headlights, engines and radios doused.

CLOSE ENCOUNTERS OF THE THIRD KIND occur when 'occupants' are reported in or around the UFO.



great nerd april fools pranks

Discovery of the Bigon

In 1996 *Discover* Magazine reported on the discovery by physicists of a new fundamental particle of matter. This particle, dubbed the Bigon, could only be coaxed into existence for mere millionths of a second, but amazingly, when it did materialize it was the size of a bowling ball. Physicist Albert Manque and his colleagues accidentally found the particle when a computer connected to one of their vacuum-tube experiments exploded. Manque theorized that the Bigon might be responsible for a host of other unexplained phenomena such as ball lightning, sinking souffles, and spontaneous human combustion. *Discover* received huge amounts of mail in response to the story.

Planetary Alignment Decreases Gravity

In 1976 the British astronomer Patrick Moore announced on BBC Radio 2 that at 9:47 AM a once-in-a-lifetime astronomical event was going to occur that listeners could experience in their very own homes. The planet Pluto would pass behind Jupiter, temporarily causing a gravitational alignment that would counteract and lessen the Earth's own gravity. Moore told his listeners that if they jumped in the air at the exact moment that this planetary alignment occurred, they would experience a strange floating sensation. When 9:47 AM arrived, hundreds of phone calls came in from listeners claiming to have felt the sensation.

Operation Parallax

In 1979 London's Capital Radio announced that Operation Parallax would soon go into effect. This was a government plan to resynchronise the British calendar with the rest of the world. It was explained that ever since 1945 Britain had gradually become 48 hours ahead of all other countries because of the constant switching back and forth from British Summer Time. To remedy this situation, the British government had decided to cancel April 5 and 12 that year. Capital Radio received numerous calls as a result of this announcement, including one employer who wanted to know if she had to pay her employees for the missing days.

Drunk Driving on the Internet

An article by John Dvorak in the April 1994 issue of *PC Computing* magazine described a bill going through Congress that would make it illegal to use the internet while drunk. The bill was supposedly numbered 040194 (i.e. 04/01/94), and the contact person was listed as Lirpa Sloof (April Fools backwards). The article said that the FBI was going to use the bill to tap the phone line of anyone who "uses or abuses alcohol" while accessing the internet. The article generated so many outraged phone calls to Congress that Senator Edward Kennedy's office had to release an official denial of the rumour that he was a sponsor of the bill.

Women in Astronomy

Part III: Captains, Catsuits, Committees and Cosmology



The story so far: the opportunities for women in astronomy went from good (Pythagoras' time) to bad (Aristotle's time) to abysmal (Hypatia's time) to ghastly (the entire modern age). As recently as the 19th and 20th centuries, female astronomers have been barred from academic institutions and had their work go unrecognised.

Nowadays, though, women are not only allowed to study physics and mathematics at university, but many places offer scholarships and other incentives to actively encourage women into the field. Great! Problem solved. Or is it?

This month's article, the final in the Women in Astronomy series, asks whether women are getting a fair go in today's society— and why it's important that they do.

Besides the savvy astrophysics chicks zappin' aliens and saving the universe on *Star Trek*, there are TV role models like Ellie Arroway in *Contact* and the softly-spoken astronomer Clara in *Back to the Future*.

Turn on the tele late on a weeknight and you might come across an old rerun of *Star Trek*. You might see B'Elanna tearing around Engineering yelling orders at her staff as sparks fly from consoles. Perhaps you'll see Seven of Nine as she studies astrometric data, plots complicated courses and uses her knowledge to save the day yet again. Or maybe you'll be shown Captain Kathryn Janeway pacing the bridge and calmly taking charge of a situation. There certainly doesn't seem to be a lack of female role models in engineering, science or astronomy here.

Nowadays, it's true that women who want to study astronomy have it a lot easier than ever before. Besides the savvy astrophysics chicks zappin' aliens and saving the universe on *Star Trek*, there are TV role models like Ellie Arroway in *Contact* and the softly-spoken astronomer Clara in *Back to the Future*. There are many real-life heroes, too— just look at Caroline Shoemaker, who co-discovered the Shoemaker-Levy 9 comet in 1993, and Jocelyn Bell, who discovered the pulsar. But so saying, is everything perfectly rosy?



Today, there's a fair bit of noise being made about promoting women in astronomy. In 1992, for example, two hundred astronomers convened at Johns Hopkins University to draw up the Baltimore Charter, a document with the aim of breaking down barriers to women's full participation in science. Conferences are being held and workshops are being run to try and get more chicks in physics. Female academics are calling for better childcare in universities. Things are getting moving.

Obviously the situation for women now is a lot better than a hundred years ago. But is all the noise about 'equal opportunity' just noise, or is it actually achieving genuine equality? A 1998 report into female scientists in Germany found that "German women who wish to raise a family are often discouraged from choosing an academic career by the length of time needed to gain the qualifications required for a university post." Female scientists complain of "the antipathy of science for women", citing "the consistent failure to appoint women to permanent research leader posts" and "the total absence of women heads of departments or sections" at universities. Helen Mason, a research associate and a don at Cambridge University, who has worked on projects such as Skylab, Spacelab II, and SOHO (Solar Heliospheric Observatory), found juggling motherhood with a scientific career to be 'interesting'. She tells the story of a visit to the Naval Research Laboratory in Washington, where she brought along her three-month old baby: "A special meeting was convened ... A policy was decided and at the end of my visit, my escort had to sign a statement that the baby 'had not shown any undue interest in the sensitive parts of the laboratory!'" Biologist Nancy Hopkins recently described MIT as a "Wild West culture", a masculine culture in which "the strong took from the weak".

"A special meeting was convened ... A policy was decided and at the end of my visit, my escort had to sign a statement that the baby 'had not shown any undue interest in the sensitive parts of the laboratory!'"

If it were taught in a way that emphasised its relevance to life around us – which is after all the primary reason for physics! – and less in a way that makes it seem like an endless nightmare of grey numbers, then maybe more girls would enjoy it.

It's obvious that the journey is far from over.

So what has to happen? Firstly, science has to be taught better at schools and presented better in the media. Most people I know – girls and boys alike – had terrible experiences with physics at school. If it were taught in a way that emphasised its relevance to life around us – which is after all the primary reason for physics! – and less in a way that makes it seem like an endless nightmare of grey numbers, then maybe more girls would enjoy it. And secondly, girls have to have good role mod-

els, by being made aware of the contributions of other females in the field.

But why is a strong female presence important in astronomy, anyway? What is the worth in investing money to promote girls' interest in physics? There are a few answers to this.

Firstly, if women are not a part of the front line of scientific research, then women won't have a say in how scientific discoveries are put to use. This means a huge loss of social power and responsibility. Secondly, if women aren't involved in science, they can't be involved in deciding which goals we should try to realise. For example, is building a new billion-dollar particle accelerator important – or is it socially irresponsible to pump money into it, when other pressing social and health issues exist? Do we rely on private enterprise to stimulate outer space exploration (by allowing corporate ownership of Moon and Mars land, for example), or do we keep these in the hands of an international governing body? Only by being a part of the action can women have their say. Science writer Margaret Wertheim thinks that one of the effects of having more women in physics will be to encourage a shift away from the “present obsession with the abstract”, and re-ground physics in “the physical, the personal, and the domestic”.

This ‘re-grounding’ of physics means re-writing gender philosophy from right back in Pythagoras’ time, finally recombining the ‘maleness’ of the abstract mathematical world with earthy, material ‘femaleness’. If this is achieved, scientific studies will progress along quite different paths. The fact that females introduce this culture of thought into physics is suggested from the results of a study in the UK, showing that women scientists spend more of their time doing interdisciplinary research than their male counterparts.

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Jeremiah Ostriker, chairman of the department of astronomy and astrophysics at Princeton University, also believes that the fresh outlook that women bring to astronomy is invaluable. He says that “a large fraction of the most important contributions to post-war astrophysics have been made by women precisely because they are outsiders.” He cites examples like Beatrice Tinsley's recognition of galactic evolution, Vera Rubin's evidence for dark matter in galaxies, and Neta Bahcall's discovery of the clumping of widely separated galaxy clusters.

Nature magazine offers a pure and simple economic reason for having more women in astronomy: “that in societies increasingly demanding a skilled technical workforce, we need to stop squandering half of our scientific potential.” And finally, there is always the simple justification that there are women whose passion is for astronomy, astrophysics and cosmology, and therefore as a society, we should give them every opportunity to pursue their dreams.



Nowadays, things are far from perfect. I still supervise first-year physics lab classes with only one or two girls for every forty boys. We *are*, however, slowly seeing a change take place. We might (and do) gripe that Seven of Nine, the astrophysics chick on *Star Trek: Voyager*, has to wear a skin-tight catsuit to get accepted in that role by the audience, but at least real-life girl astrophysicists aren't getting the same deal that was dished out to Winkelman or Theano or, God forbid, Hypatia in times gone by. Instead, we've got women discovering comets and heading NASA exploration missions and leading research teams at universities. If the process of reform keeps up, the future looks great.



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QUANTUM MECHANICS EAT STEAK

Yep, quantum mechanics make big bucks. Heavy bread. They're rolling in dough. They carry big wads of 10's and 20's in their pockets. A lot of MONEY. They drive Cadillacs and buy their wives minks. And they eat steak.

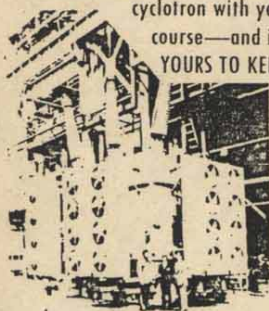
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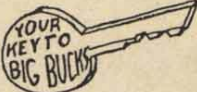
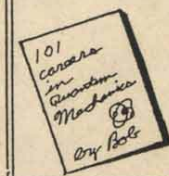
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WARNING

The following paragraphs contain unapologetic editorial ranting, political comment and an attack on a beloved science fiction series.

Readers of a more sensitive disposition should turn to the next page now.



A Special “**Golden Rimmer**” Award is presented this month to the newest Star Trek spin-off-series *Enterprise* for going to unexpected lengths in producing a series not only lacking in good science, but actively promoting the sort of anthropocentric, arrogant and xenophobic attitudes that underlie most of the stupid things nations do to each other in our world today.

I can’t say forcefully enough how much I was angered by last week’s episode of *Enterprise*. Maybe it is because I watched the tape of it right after *Media Watch*, which showed 20 minutes of inexcusable and sickening dishonesty in war reporting by United States news networks. Then to flip to an ‘escapist’ sci-fi show and be presented with the same sort of wilful lack of cultural understanding perpetrated by Captain Archer—perhaps it was a bit too much.

It’s like this. The *Enterprise* has had the side blown off it by a mine it ran into in the Romulan zone. In its damaged state, it will take the crew a decade to get back to Jupiter repair yards, and the long range communications are on the blink so they are well and truly stranded. Reluctantly they put out a local distress signal—and what do you know, they find themselves invited to a nearby automated repair station that repairs their ship in a day and a half, treats all their crew to a big party on-the-house while they’re waiting, and only asks for a measly payment in return. Sounds like they got a great deal.

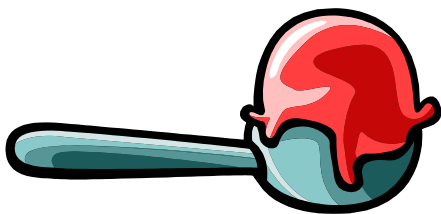
Well, the captain doesn’t think so. He doesn’t like it from the moment they first dock, because it’s *different* to what he’s used to. “I think they should work a bit on their hospitality,” he says as he steps aboard the repair craft—despite the fact that the repair station has conveniently reconfigured its atmosphere, language, size and even menu to accommodate the crew and their ship. No, the captain is suspicious because there hasn’t been a delegate there to shake their hands upon arrival as *real* Americans, oops, humans should do.

It just doesn’t occur to him that different cultures might have different ways of doing things. This theme carries all the way through to the end of the episode, where the captain accepts his gift (the repair work) calmly and then, in retaliation for the harming of one of his crew, totally blows up the beautiful feat of engineering that is the entire repair station without asking any questions (like Sisko would have done), without examining his conscience (like Kirk would have done) and without seeking a diplomatic solution (as Picard would have done). This is presented to us, the viewers, as a heroic feat.

I’m a big Star Trek fan, but this is the first episode of *Enterprise* I’ve watched for about six months, precisely because the previous time I watched it I had the same reaction. In that episode, the captain would bristle every time the Vulcan overseer T’Pol entered the bridge. Why? Because she refused to see that the American, oops, human way of doing things was *best*.

I object to such arrogant mindsets being projected by the series onto all humankind. I object to blatant and militaristic cultural imperialism being touted as a laudable characteristic of humanity. The theme music makes me want to vomit. And I yearn to see an episode where Picard comes back from the future, teams up with T’Pol and has Archer court-martialled for offensive stupidity and narrow-mindedness.

Here’s to Captain Jonathan Archer, the George W. Bush of the next century, blowing up things he doesn’t understand and then coating the action with a sickly sweet spin of good will and moral intentions.



Cooking Corner

Liquid Nitrogen Ice Cream

Recipe courtesy of Terry Burns, Newcastle University

The premise of making ice cream with liquid nitrogen is a bit like using liquid oxygen to light a barbeque grill: the outcome is the same, you just get there a hell of a lot quicker (and look a lot cooler at the same time).

Liquid nitrogen ice cream is a great idea for physics societies to use at BBQs and promotional events. You should be able to get your hands on some liquid nitrogen by asking the guy in charge of the lab equipment at uni really, really nicely—most physics departments make their own, and per litre, it works out to cost about the same as milk.

The preparation method is the same as for normal ice cream, up to the point where it would normally get chucked into the freezer. In the (much more fun) *nerdling* method, the freezing is done by pouring in liquid nitrogen at -196°C and stirring everything around. The nitrogen cools down the ice cream mixutre, then turns into nitrogen gas and evaporates harmlessly into the atmosphere, making incredibly cool mad-scientist mist and leaving some damn tasty ice cream.

The preparation requires two people: one to stir and one to pour the nitrogen. The stirrer can wear protective gloves if he or she wishes, but it's not absolutely necessary. It is actually possible to have liquid nitrogen poured gently over your skin without harming yourself (the nitrogen closest to your skin will immediately vaporise, creating an insulating gas layer that protects you); of course, if you dunk parts of your body into liquid nitrogen and leave them there, you're asking for trouble. *You should always exercise caution when using liquid nitrogen.*

Step 1: go down to the shops and assemble this stuff:

- . one teaspoon of gelatine
- . half a cup of hot water
- . a tin of evaporated milk
- . one litre of plain milk
- . a cup of caster sugar
- . 300 mL of thickened cream
- . flavoured topping (if desired)

Step 2: scrounge around the physics building and your kitchen to get this equipment:

- . electric beaters
- . a bucket (*not* the one you use in the lab)
- . a wide wooden spoon
- . a container of liquid nitrogen

Step 3: Take the half cup of water, chuck in the gelatine, stick it all in the microwave until it's hot and the gelatine has dissolved. Then sit it aside for now.

Step 4: Grab a clean, empty 2L milk container and add 1 litre of milk. Add the evaporated milk and the caster sugar, screw the lid on and shake it until all the sugar has all dissolved. Then add the cream, shake that thing a bit more, and stick it in the fridge.

Step 5: The fun bit.

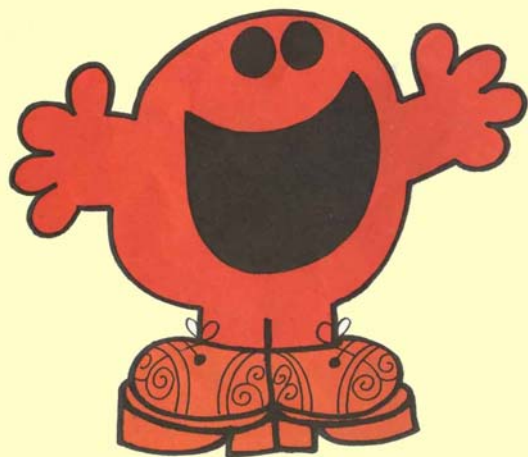
Grab the bucket and put it somewhere where it will look really cool and you will get maximum respect from the admiring crowd. Now pour in the gelatine solution and the cream solution (and some flavouring if you like) and start to beat it on high speed with the electric beaters. A second person should start pouring in the liquid nitrogen at the same time: fast enough so everything gets cold real quick but not so fast that lumps of ice form. At this point there will be an awesome fog and you can if you wish do a mad-scientist laugh.

When the beater starts to stall, remove it and use the wooden spoon to keep stirring. A volume of about 2 litres should result.

Use an ice cream scoop to spoon the mixture into cones and share it around! (The mixture can also be stored in the freezer till later, but this sort of defeats the purpose.)

Step 6: Eat, enjoy, and use the left over liquid nitrogen to freeze and smash flowers, banana peels, squash balls and stuff :)





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noisy advocate of nerd culture

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